How Does Food Price Volatility Affect Food and Nutrition Security (FNS) ?

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Overview

1. Developments of food prices and volatility

2. Empirical and conceptual linkages to food security

3. Components of an early warning system for food security

Food price indices of low and middle income countries
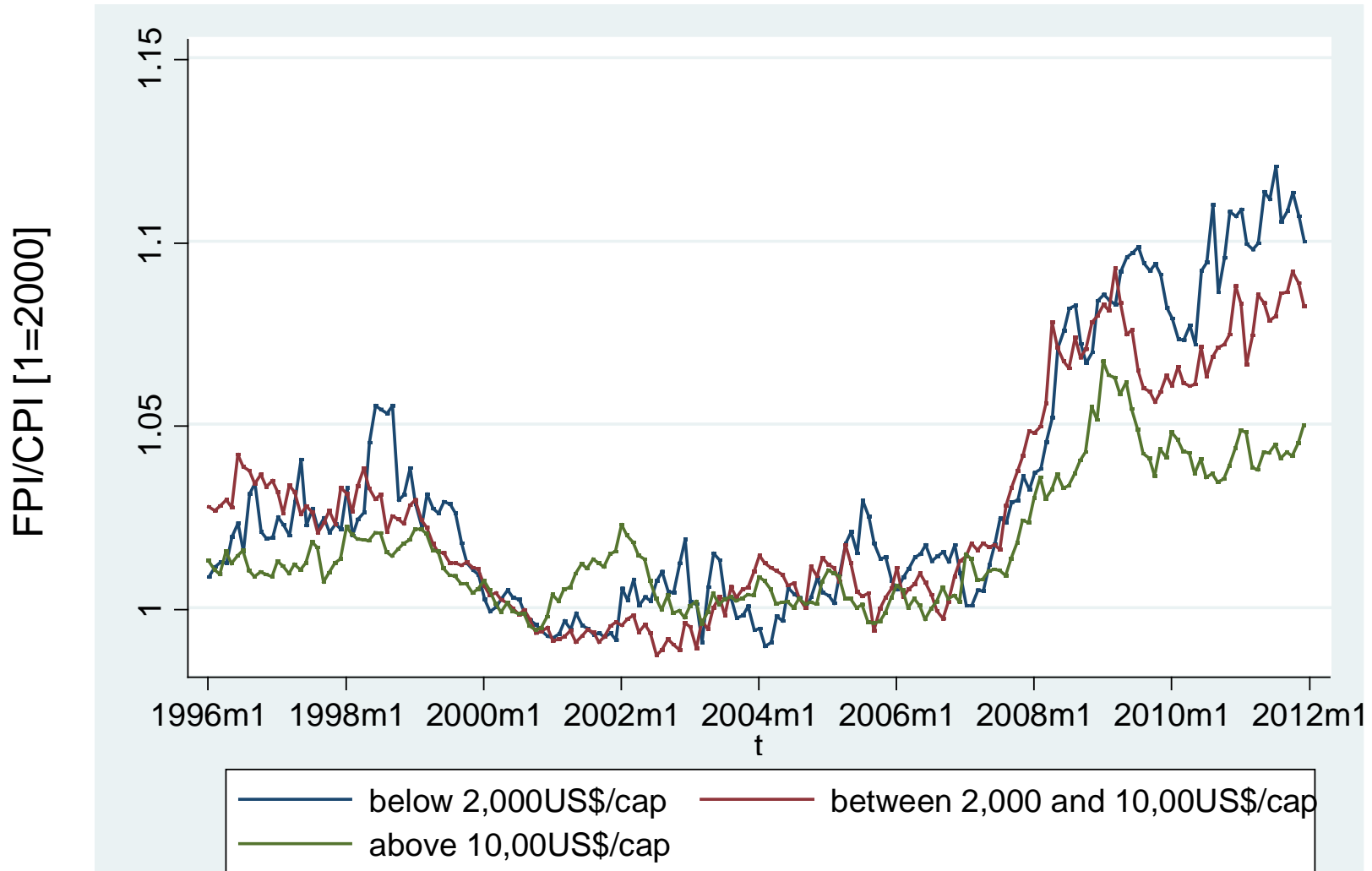
Source: own calculations based on ILO data

How do global price shocks impact FNS?
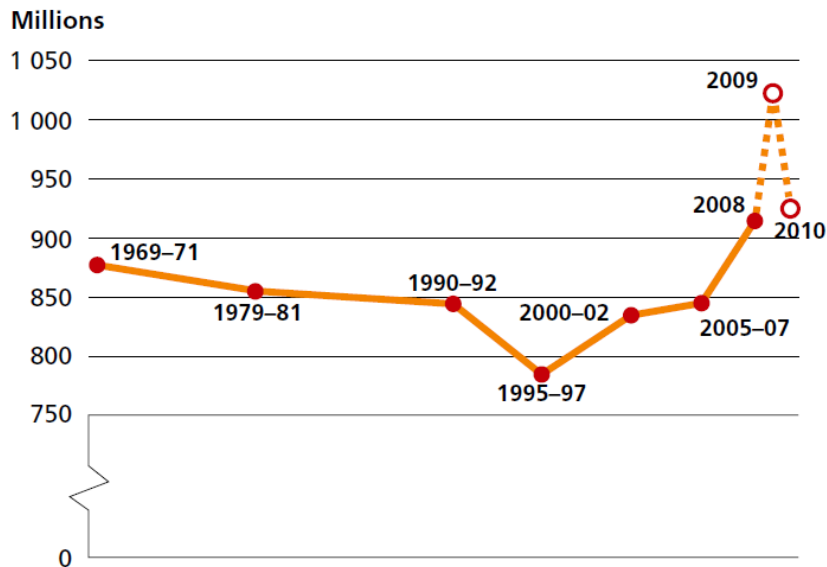
Few estimates of 2007/08 crisis

- Undernourishment: 63 million people (Tiwari and Zaman 2010)

- Poverty: 105 and 155 million people (Ivanic and Martin 2008; de Hoyos and Medvedev 2009)

- ‚Perceptions based': 96 million people more food-insecure (Headey 2011)

FAO estimates on undernourished people not appropriate for short-term effects
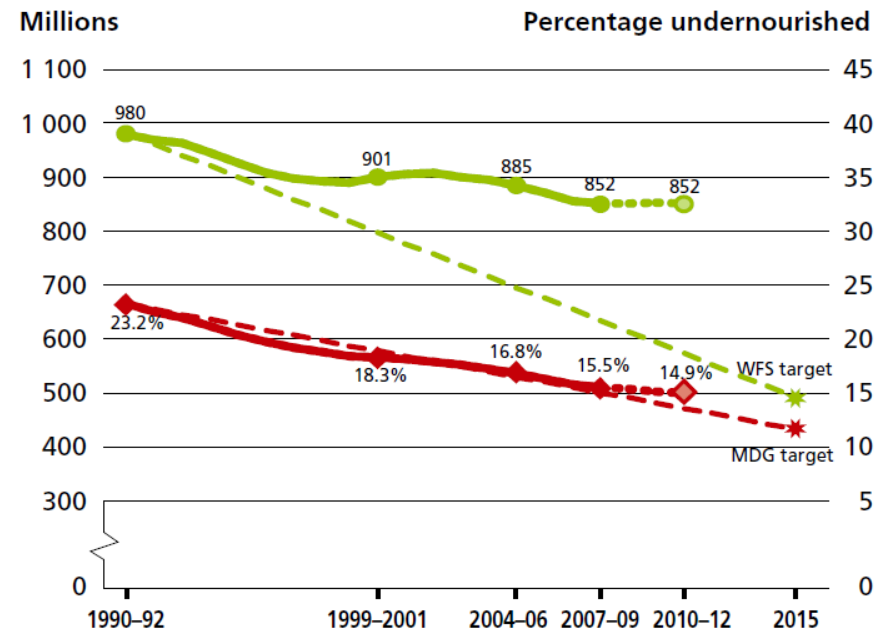
How do global price shocks impact FNS?

FAO estimates on undernourished people not appropriate for short-term effects

Number of undernourished people in the world, 1969–71 to 2010

Undernourishment in the developing world

FAO 2010

FAO 2012

Our Research Objective

Develop an information system that links

current global price developments

to local food security

Why focus on anthropometric data?

Anthropometric data:

- Body weight and height compared to reference group
- Biomarkers (i.e. hemoglobin)

Why anthropometric data?

- Closely related to quantity and quality of food diet
- Direct measure of nutritional and health status
- Food security (FAO): Availability, access, utilization, reliability
- Closely related to well-being
  - Short term: Diseases, child mortality
  - Long term: Disabilities (e.g. blindness), low cognitive development

Conceptual Framework

How do price changes affect FNS?

- Food price increase
  - Real income reduction for net buyers
  - Real income increase for net sellers

- Food price volatility
  - Increases likelihood and extent of real income reduction (for both net buyers and net sellers)

Conceptual Framework

FAO
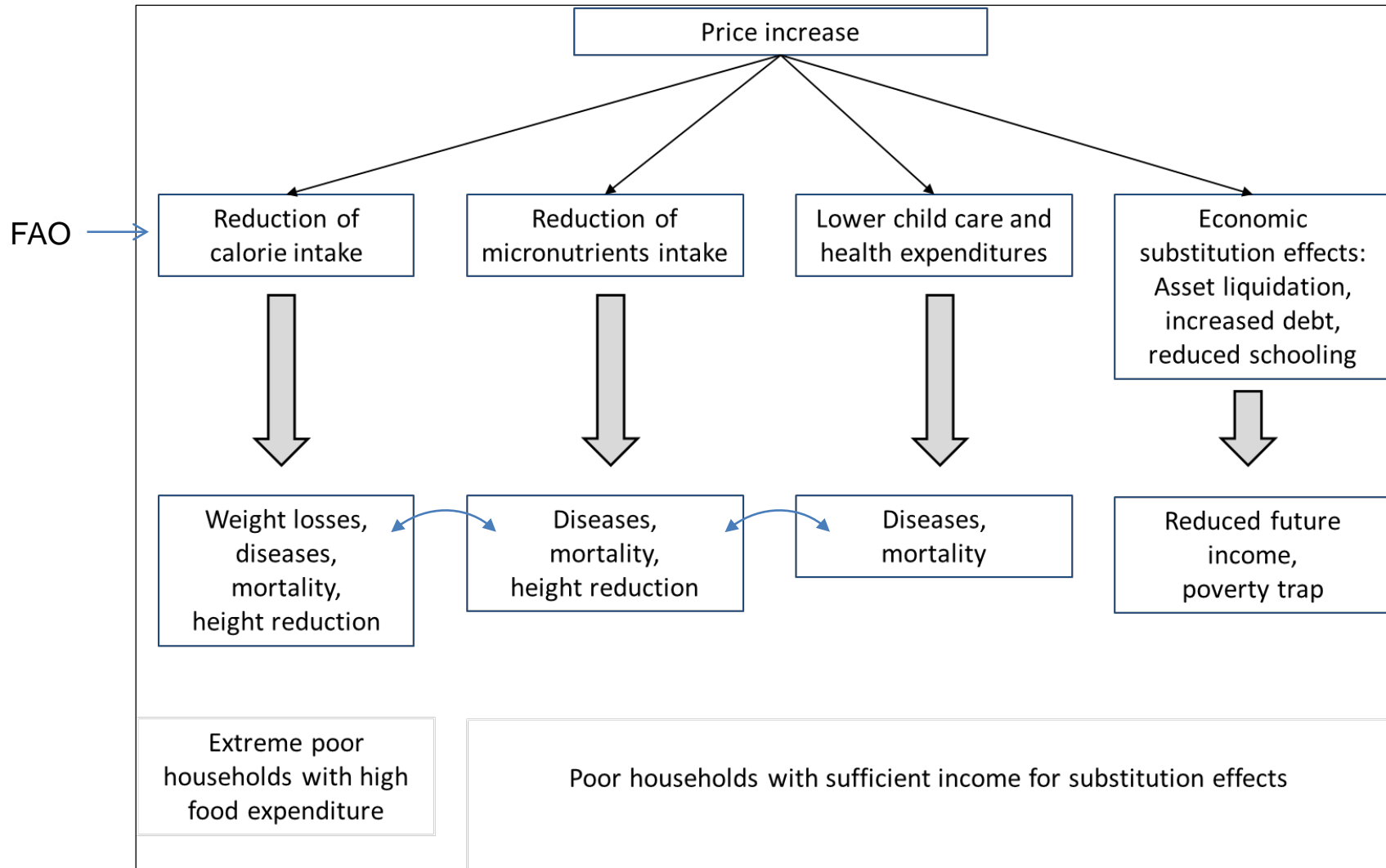
Source: own illustration

FNS affected through different channels

Volatility - FNS

Simple panel regression:

$$N_{i,t} = \alpha_1 \ln(GDP_{i,t}) + \alpha_2\, SAN_{i,t} + \alpha_3\, VOL_{i,t} + \alpha_4\, FEED_{i,t} + u_i + \epsilon$$
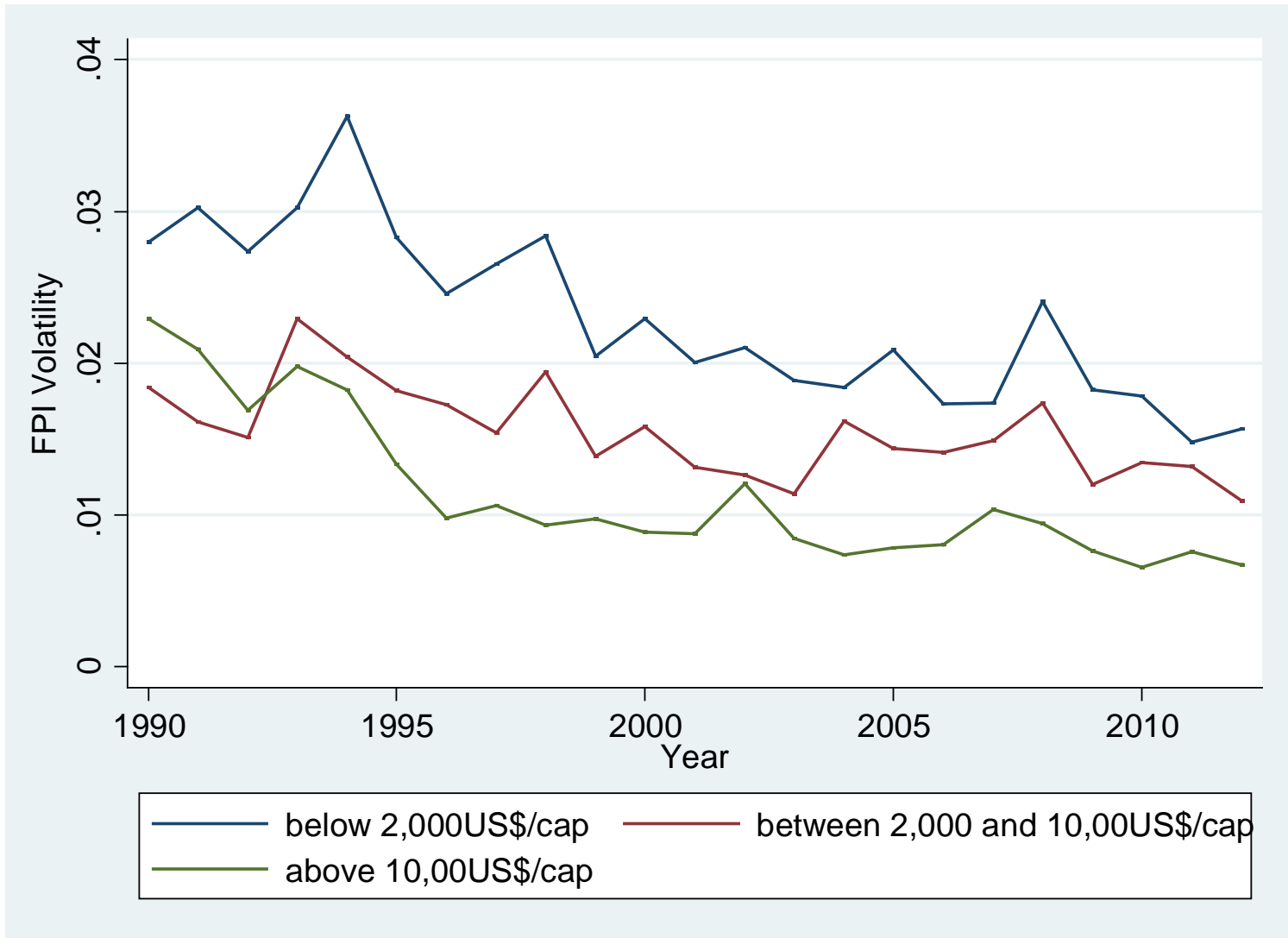
Data: *Worldbank development indicators:* GDP, Sanitation, Breastfeeding, Stunting, Underweight. *ILO LABORSTAT*: Food price indices

1990-2012, Low and middle income countries, 2737 observations

Considered nutritional outcomes:
- Stunting
- Underweight

Volatility higher in poor countries

Volatility - Underweight

	Underweight			
	(1)	(2)	(3)	(4)
Log GDP (PPP/cap)	-2.067***	-1.497	-2.015***	-1.19
	(0.688)	(1.401)	(0.709)	(1.608)
Improved Sanitation	-0.086***	-0.269***	-0.064***	-0.178**
	(0.021)	(0.057)	(0.020)	(0.078)
Food Price Volatility	33.660***	26.298***	30.443	48.951*
	(9.252)	(9.508)	(19.873)	(25.152)
Breast-feeding			-0.044***	-0.042*
			(0.014)	(0.021)
Fixed-effects	no	yes	no	yes
N	241	241	132	132

significant at *** 1%, ** 5%, * 10% level

Volatility - Stunting

	Stunting			
	(1)	(2)	(3)	(4)
Log GDP (PPP/cap)	-4.418***	-2.647	-4.017***	-1.153
	(1.059)	(2.985)	(1.356)	(2.971)
Improved Sanitation	-0.104***	-0.472***	-0.086**	-0.141
	(0.032)	(0.134)	(0.037)	(0.132)
Food Price Volatility	51.003***	37.893*	48.352	89.605*
	(17.058)	(19.978)	(40.289)	(46.631)
Breast-feeding			-0.032	-0.086**
			(0.025)	(0.040)
Fixed-effects	no	yes	no	yes
N	233	233	131	131

significant at *** 1%, ** 5%, * 10% level

Price Change - FNS

Bangladesh:

Torlesse et al. 2003: stunting significantly positively associated to rice expenditures

Campbell et al. 2010: underweight significantly positively associated to rice expenditures

But: no direct link to prices and macro-variables

→ own estimation

$$N = \alpha\, FPI + \beta\, X + c + \epsilon$$

FPI: Food price index (deflated by CPI)   [ILO]

X: GDP (real) per capita, sanitation, year [WorldBank]

N: Stunting, underweight [WorldBank]

Bangladesh: Food Price - FNS

	Prevalence of underweight (children under 5 years) (log)					
	(1)	(2)	(3)	(4)	(5) Differences	(6) Differences
FPI (log)	3.562**	3.559***	2.834***	1.967**	1.805*	2.483**
	(1.195)	(0.870)	(0.726)	(0.674)	(0.829)	(0.821)
GDP (log)	-1.333***			1.035*	1.293	
	(0.120)			(0.506)	(1.142)	
Improved sanitation		-0.052***		0		-0.021*
		(0.003)		(0.021)		(0.010)
Year			-0.045***	-0.078**		
			(0.003)	(0.025)		
N	14	14	14	14	13	13
R²	0.938	0.963	0.97	0.978	0.344	0.332
F	83.842	220.361	208.257	96.756	2.846	7.49
Increase in underweight children (2007/08 compared to 2005/06)	9.3%	9.3%	7.4%	5.1%	4.6%	7.1%

significant at *** 1%, ** 5%, * 10% level

15

Cross-country analysis with microdata

- Household surveys conducted in several rounds in several countries

- Build comprehensive cross-country database

$$N_{i,t} = \alpha\,FPI_{i,t} + \beta\,X_{i,t} + \gamma Y_{i,t} + u_i + \epsilon$$

FPI   Food price index
X   HH and individual's characteristic (micro data)
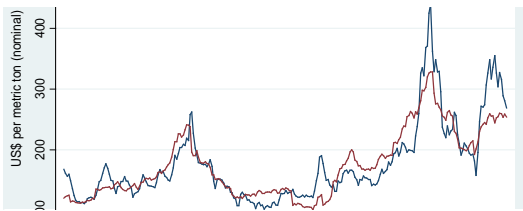Y   Macro data (GDP, World Bank Dev Indicators)

Using transmission database: $\Delta\,FPI_{i,t} = \tau_i\,\Delta\,GFPI_t$

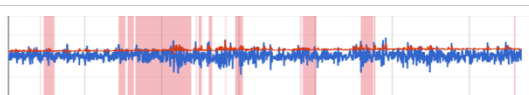$$\Delta\,N_{i,t} = \alpha\,\tau_i\Delta GFPI_t + \gamma\Delta Y_{i,t} + v_i$$

Outlook: Early Warning System

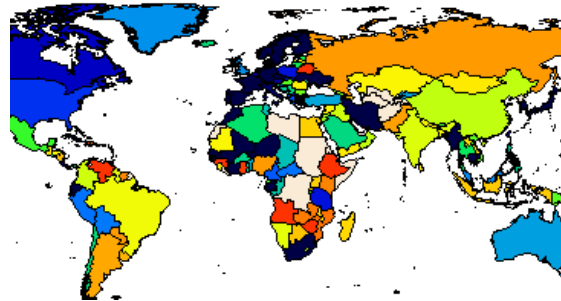| Price dynamics	Transmission	Vulnerability

Price development due to market fundamentals

Excessive returns on exchanges

Global price transmission database

Economic and social indicators

- Income
- Poverty
- Safety nets
- Share of food expenditure of the poorest
- Import dependency
- Chronic undernutrition

supplemented by current news – mapping information (daily, monthly)

foodsecurityportal.org   fews.net

Application of the Information System

- For responsible investment and (self-)regulation (speculation in agricultural commodities)

- Information base for risk management (national & international)